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My Thoughts / My Surgical Practice

# Fully therapeutic laparoscopy for penetrating abdominal trauma in stable patients

In 1960 Dr. Shaftan et al. first challenged the idea of exploratory laparotomies for penetrating abdominal trauma (PAT) with his 'selective conservatism' approach. The evaluation and management of PAT has evolved in the last 20 years.[1] Laparoscopy has become the standard approach for most of the acute care surgery diseases and its utility in trauma has been increasingly investigated.[2] In actual reports, surgical exploration in the setting of PAT has been associated with non-therapeutic laparotomy rates of 61%. The application of laparoscopy for PAT has multiple benefits for the patient, and its use is feasible in trauma depending on the patient's hemodynamic stability, surgeons experience and institutional resources availability.[2,3]

The laparoscopic approach for PAT has been studied for diagnosis, and therapy. The laparoscopic surgeons experience has evolved and allowed to decrease the missed injuries from 13% to 0.12%.[1,3,4] The aim of this study was to analyze the safety and efficacy of fully therapeutic laparoscopy for PAT.

We performed a retrospective study of PAT patients with hemodynamic stability who presented to 2 medical centers in Bogota Colombia between December 2018 and December 2019. All patients underwent to diagnostic with fully therapeutic laparoscopic surgical treatment. Our chart review included 192 patients with PAT. Patients who were hemodynamically unstable, partial or not fluid resuscitation responders, under 15 years of age were excluded. Twenty four patients met selection criteria and underwent initial laparoscopic evaluation with diagnosis and fully therapeutic laparoscopic definitive treatment. Sociodemogrphic, intraoperatory and postoperatoy variables were analyzed.

The patients were evaluated by a multidisciplinary group of surgeons with training in laparoscopy and trauma surgery. The benefits, complications and the possible need of conversion to open surgery were explained to all patients and clearly exposed in the informed consent. The type of PAT was classified between a gunshot wound and stab wound. Intraoperatively, the therapeutic approach was defined after the initial damage assessment, the surgeon's expertise, the degree of contamination and the general condition of the patient.

All the hemodynamically stable patients included in the study with anterior abdominal stab wound, were taken to a preoperative local exploration of the wound. The anterior, lateral and left thoracoabdominal stab wounds were not locally explored and were taken to diagnostic laparoscopy (DL). The right thoracoabdominal stab wounds underwent only to DL in those patients with signs of peritoneal irritation at the physical exam. Hemodynamically stable patients with anterior abdominal gunshot wounds, with or without signs of peritoneal irritation, were taken to DL for define the need of FTL, assisted therapeutic laparoscopy (ATL) or laparotomy with a previous abdominal computed tomography for rule out major vascular and retroperitoneal injuries.

The surgical technique for FTL for PAT was performed under general anesthesia, in a French position, with the surgeon between the patient's legs. Hasson open technique for pneumoperitoneum creation. A 10-mm umbilical port for the 30-degree camera and two 5-mm umbilical ports on the flanks are placed, to obtain adequate triangulation. One of the 5mm ports can be converted to 12mm to allow sutures to be inserted if FTL is required to perform primary repairs with intracorporeal sutures and knots, using 3–0 polydioxanone, resections and intracorporeal anastomosis. The number of ports is variable depending on the surgeon's needs and the type of injury founded. A systematic inspection must be made of the entire peritoneal cavity and the gastrointestinal tract including the solid organs. It starts in the upper right quadrant and continues in a clockwise direction. To explore the supramesocolic region, we must place the patient in the reverse Trendelenburg position. Check liver, gallbladder, spleen, diaphragm, minor sac, pancreas, opening the omentum trans cavity through the gastrocolic ligament, stomach, and duodenum. Emphasize must be taken in the deep areas of the upper quadrants. The surgeon pass to the transverse and descending colon, placing the patient in Trendelenburg position to view and examine the rectum, Douglas sac, pelvic organs, cecum, and the right colon. Small bowel revision is performed using atraumatic laparoscopic forceps and is inspected from the ileocecal valve to the duodenal jejunal flexion and viceversa. Always checking both anti mesenteric and mesenteric faces.[2]

During the study period, 24 hemodynamically stable patients with PAT underwent diagnostic laparoscopy and in the same procedure fully therapeutic laparoscopy was performed. Fifteen were male patients (62,5%), with an average age of 27,8 years (16–44 years). Twenty-One patients presented anterior abdominal penetrating wounds and 3 had thoracoabdominal penetrating injuries. Nineteen patients had abdominal stab wounds (79,1%), and 5 patients presented abdominal gunshot wounds (20,9%). Initially, all patients were taken to DL and only 2 (8.3%) did not need another intervention. Twenty-one patients required FTL, which included procedures as intracorporeal primary repair of hollow viscera injuries. Only 1 patient required conversion to open surgery due to active uncontrolled bleeding in the transverse colon mesentery and the impossibility of ruling out a lesion in the antimesenteric wall of the transverse colon. None of the patients present missed injuries or required intensive care unit (ICU). There was no

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mortality. The average length of hospital stay was 1,3 days, and tolerance to the oral intake food was in the first 24 hours for all patients.

Laparoscopy is significantly better than open approach. It decreases postoperative pain, length of hospital stay, risk of surgical site infection (SSI) and postoperative small bowel adhesions.[2,5] The length of hospital stay reported in our study was an average of 1,3 days, much less than that reported by Shamim et al. In their analysis of the National Trauma Bank on abdominal trauma.[5] In adults, laparotomy reports a mortality between 11 and 13%; and mean length of hospital stay 6–26 days.[6,7] Laparoscopy has decreased the rate of non-therapeutic laparotomies (33.3% morbidity and 5% mortality) in 61%–89%.[6,7] In comparison to our study, no mortality cases were reported. Bain et al. showed 56 diagnostic laparoscopies secondary to PAT with a mean age of 40 years old, superior to our reported average age of 27.8 years old.

The surgeon's clinical decision making is necessary for choose the ideal patient for laparoscopic approach in PAT. The laparoscopic technical skill of the surgeon is crucial for decide whether go from DL to ATL or FTL and conversion to open surgery according to findings, operative visual field, active bleeding, retroperitoneal injury, degree of contamination and general condition of the patient.[3] In case of diagnostic doubts and adequate laparoscopic experience, laparoscopy has been shown to be more accurate in detecting intra abdominal injuries in stable patients.[2] The rate of ATL or FTL reported in the literature varies between 13,8% and 83%, associated to the surgeons expertise. Some studies show a conversion rate to open surgery of 17,9%.[3] In our study, only one patient (4,1%) required conversion to open approach. None of our patients required postoperative ICU, similar results to other described series.[3,7–9]

The laparoscopy pneumoperitoneum directly affects the hemodynamic patient state, decreasing venous return, including pneumothorax due to unnoticed diaphragmatic tears. The duration of the procedure can perpetuate the death triad.[2] One of the main problems of the DL and FTL approach for PAT is the high risk of missed injuries, particularly of hollow viscus. The rate of missed injuries has dropped from 13% to 0,12%, that do not differ with the open approach. This risk can be mitigated performing a systematic review of the abdominal cavity as in our DL and FTL surgical protocol.[3,9] In our case series, none patient presented missed injuries.

FTL is a safe and efficient procedur for PAT in hemodynamic stable patients and must be part of the trauma surgeon armamentarium for avoid the long term non therapeutic laparotomy morbidity. Experience in advanced laparoscopic skills is a determining factor in the patient outcomes.

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